ENERGY-AVERAGED NEUTRON CROSS SECTIONS OF FAST-REACTOR STRUCTURAL MATERIALS*

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ABSTRACT

The status of energy-averaged cross sections of fast-reactor structural materials is outlined with emphasis on U. S. data programs in the neutron-energy range 1-10 MeV. Areas of outstanding accomplishment and significant uncertainty are noted with recommendations for future efforts. Attention is primarily given to the main constituents of stainless steel (e.g., Fe, Ni, and Cr) and, secondarily, to alternate structural materials (e.g., V, Ti, Nb, Mo, Zr). Generally, the mass regions of interest are $A \gtrsim 50$-60 and $A \sim 90$-100. Neutron total and elastic-scattering cross sections are discussed with the implication on the non-elastic-cross sections. Cross sections governing discrete-inelastic-neutron-energy transfers are examined in detail. Cross sections for the reactions (n;p), (n;n',p), (n;α) (n;n',α) and (n;2n') are reviewed in the context of fast-reactor performance and/or diagnostics. The primary orientation of the discussion is experimental with some additional attention to the applications of theory, the problems of evaluation and the data sensitivity of representative fast-reactor systems.